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Formation of tonic effects of the autonomic nervous system parts on the developing heart

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Abstract

This paper deals with the study of formation of extracardiac neural effects on cardiac activity of dogs and rats in the postnatal ontogenesis performed through vagotomy and administration of blocking agents in the intact and sympathectomized animals. Experiments on growing animals showed that the tonic effects of the vagus nerve on a pacemaker develop gradually as the sympathetic tone develops. The experimental data obtained in growing dogs and rats indicate that the contribution of the heart rate or stroke volume to the heart adaptation can vary at different stages of ontogenesis as regulatory effects of the autonomic nervous system on these parameters develop in heterochronic manner. We have found that the tonic effects of the sympathetic part of the autonomic nervous system on myocardial contractility appear later than in relation to the heart rate. Experiments on sympathectomized growing animals revealed that the positive chronotropic effect occurring at vagus nerve transection does not depend on the intactness of the sympathetic nervous system. Nevertheless, the findings bear evidence that both parts of the autonomic nervous system in vivo take part in the regulation of cardiac activity, and the relations between the sympathetic and parasympathetic influences form the final effect.

Keywords

Heart, Ontogenesis, Sympathectomy, Sympathetic nerve, Tone, Vagus nerve